

Flux Measurements on 7 ID before and after Replacement of the Commissioning Window

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During the September shutdown of 2004, the old commissioning window assembly (two 10-mil Be windows protected by a filter of CVD diamond/graphite) at the 25.5-m point of the 7-ID beamline were replaced with a new polished 20-mil Be window (without CVD filter). To determine the benefit of these upgrades, x-ray flux measurements were done in the 7ID-B hutch, and the wavefront distortion was measured by taking images of the raw beam.

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One set of flux measurements was taken on 19.Aug. 2004, before the upgrade. The monochromator was set to energies from 6.5 keV to 13 keV in steps of 0.5 keV. For each energy, the undulator gap was optimized, and the piezo on the second crystal was tuned to maximum throughput. The APS was running in non-topup mode, and there were about 93 mA in the ring (see below). The white-beam slit (Slit 1) was set to 2.0 mm (H) by 1.0 mm (V). The flux was measured with an ionization chamber in the B hutch, right at the exit of the micro-monochromator (about 10 cm downstream of it). To convert from current in the ionization chamber to x-ray flux, the conversion tool on the EPICS screen was used.

The Be windows and the CVD graphite were replaced/removed during the shutdown, and on the 7.Oct. 2004, another set of flux measurements was taken for the same monochromator energies as before. This time, the APS was running in top-up mode at a constant 102 mA in the ring. As before, the undulator gap was optimized for each energy, and the piezo on the second crystal was adjusted to full, and also to approximately half, throughput. The slit 1 settings were the same as before, 2.0 (H) by 1.0 (V). Figure 1 shows a comparison of the x-ray fluxes with and without the Be windows. The curve “with CVD” was scaled up by a factor of $1/0.93$ to account for the lower current in the ring. The exact current at the time of the measurement is not recorded, so the value of $1/0.93$ was determined by making the two curves (“with” and “without”) coincide at higher energies (12-13 keV), where the additional carbon should have no effect. According to the APS log, the current at 18:30 h on 19.Aug. 04 (the time the data were taken) was 95 mA, so the factor of $1/0.93$ is consistent with the ratio of 95 mA vs. 102 mA. Figure 2 shows the piezo voltages required to tune up the monochromator to full throughput. The jump in the curve of 7.Oct. 04 is probably due to piezo hysteresis because

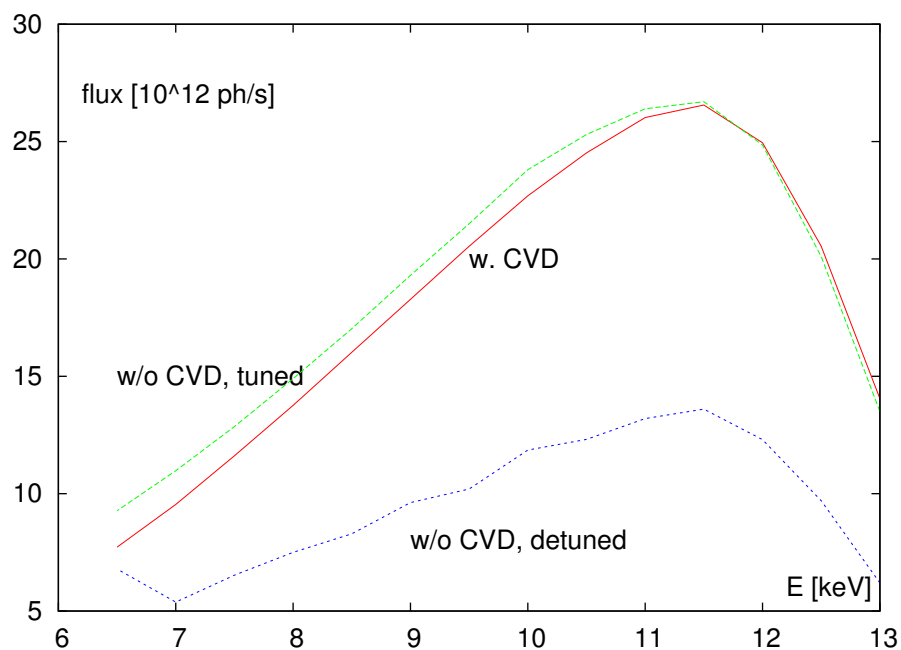


Figure 1: Comparison of the x-ray flux before and after the beamline upgrade. Before is “w. CVD” and after is “w/o CVD”.

the data for 10.0 keV down to 6.5 keV were taken first, and then data were taken for 10.5 keV up to 13 keV.

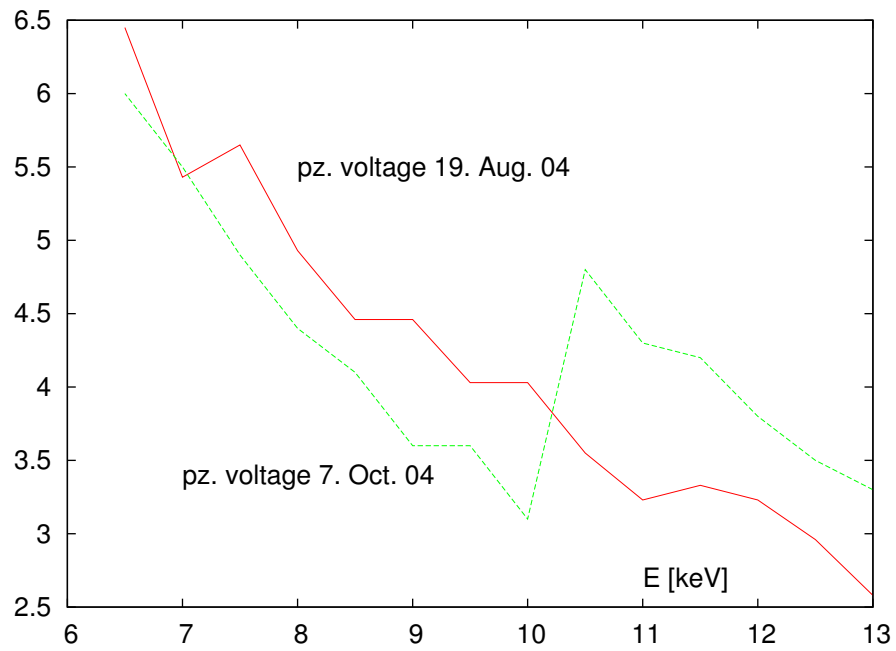


Figure 2: Piezo voltage when fully tuned up.